BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Implementation of the Local Competition Provisions in the Telecommunications Act of 1996	)	CC Docket No. 96-98
	)	
Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers	)	CC Docket No. 95-185

AFFIDAVIT OF

THOMAS M. JORDE, J. GREGORY SIDAK, AND DAVID J. TEECE

IN RESPONSE TO

SECOND FURTHER NOTICE OF PROPOSED RULEMAKING

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INTRODUCTION

1. In response to the Supreme Court's January 1999 decision in *AT&T Corp. v. Iowa Utilities Board,*[1] which struck down the FCC's interpretation in the *Local Competition First Report and Order*[2] of the "necessary" and "impair" requirements of section 251(d)(2) of the Telecommunications Act,[3] the Commission now seeks comments in this *Second Further Notice of Proposed Rulemaking* on "how the unbundling obligations of the [Telecommunications Act of 1996] can best facilitate the rapid and efficient deployment of all telecommunica-

1. 119 S. Ct. 721 (1999).
2. Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, First Report and Order, CC Dkt. Nos. 96-98, 95-185, 11 F.C.C. Rcd. 15,499 (1996) [hereinafter *Local Competition First Report and Order*].

tions services, including advanced services."[4] To assist the Commission in answering that question, the United States Telephone Association (USTA) has asked us to analyze how the Commission's interpretation of the "necessary" and "impair" standards are likely to affect innovation, investment, and product development in the U.S. telecommunications industry.

2. The application of time-tested economic theory to the telecommunications industry allows us to conclude that mandatory unbundling at prices computed on the basis of the total element long-run incremental cost (TELRIC) of the various network elements belonging to an incumbent local exchange carrier (ILEC) will adversely affect the ILEC's incentives not only to upgrade or maintain existing facilities, but also to invest in new facilities. Mandatory unbundling at TELRIC prices also will encourage competitive local exchange carriers (CLECs) to deviate from the socially optimal level of investment and entry. Finally, the confluence of mandatory unbundling and other Commission policies aggravate the distortion of investment decisions.

QUALIFICATIONS

3. My name is Thomas M. Jorde. I am professor of law, University of California at Berkeley. I specialize in antitrust, intellectual property, and civil procedure. I am cochair of

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3. 47 U.S.C. § 251(d)(2).

4. *See* Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 and Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, Second Further Notice of Proposed Rulemaking, CC Dkt. Nos. 96-98, 95-185, ¶ 3 (released Apr.16, 1999) [hereinafter *SFNPRM*].

Boalt Hall's Program in Technology and Law. I am also president of LECG, Inc., an economic consulting firm. I received A.B. and J.D. degrees from Yale University.

4. I have served as a law clerk to Justice William Brennan, U.S. Supreme Court; special assistant to the Bureau of Competition of the Federal Trade Commission; special master in the U.S. District Court for complex antitrust legislation; and as a private mediator.

5. I have written extensively and testified before Congress on the subject of competition policy and innovation, and I have presented "The Changing Nature of Competition in a Global and Innovation-Driven Age" and "Antitrust, Innovation and Competitor Cooperation" at the Federal Trade Commission. Relevant books include *Antitrust, Innovation, and Competitiveness* (Oxford University Press 1992), with David J. Teece; and *Intellectual Property in the New Technological Age* (Little, Brown & Co. 1997), with Mark Lemley, Peter Menell, and Robert Merges. Published articles of mine that are relevant to this proceeding include, "Rule of Reason Analysis of Horizontal Arrangements: Agreements Designed to Advance Innovation and Commercialize Technology," 61 *Antitrust Law Journal 2* (1993), with David J. Teece; "Assessing Market Power in Regimes of Rapid Technological Change," 2 *Industrial and Corporate Change* 3 (1993), with Raymond Hartman, David J. Teece, and Will Mitchell; "Antitrust Policy and Innovation: Taking Account of Performance Competition and Competitor Cooperation," 147 *Journal of Institutional and Theoretical Economics* 120 (1991), with David J. Teece; "Summary Judgment in Antitrust Cases: Understanding *Monsanto* and *Matsushita*," 36 *Antitrust Bulletin* 271 (1991), with Mark Lemley; "Innovation and Cooperation: Implications for Competition and Antitrust," 4 *Journal of Economic Perspectives* 3

(1990), with David J. Teece; and "Innovation, Dynamic Competition, and Antitrust Policy," 13 *Regulation* 35 (1990), with David J. Teece.

6. My name is J. Gregory Sidak. I am the F. K. Weyerhaeuser Fellow in Law and Economics at the American Enterprise Institute for Public Policy Research (AEI) in Washington, D.C., where I direct AEI's Studies in Telecommunications Deregulation. I am also a senior lecturer at the Yale School of Management, where I teach a course on telecommunications regulation and strategy with Professor Paul W. MacAvoy. In addition to holding those two academic positions, I am a managing director of LECG, Inc.

7. I have worked in the federal government on three occasions. From 1987 to 1989, I was deputy general counsel of the FCC. From 1986 to 1987, I was senior counsel and economist to the Council of Economic Advisers in the Executive Office of the President. From 1981 to 1982, I served as a law clerk to Chief Judge Richard A. Posner during his first term on the U.S. Court of Appeals for the Seventh Circuit. In addition to having worked in government, I have previously worked, as an attorney in private practice, on numerous antitrust cases and federal administrative, legislative, and appellate matters concerning telecommunications and other network industries.

8. My academic research concerns regulation and strategy in telecommunications and other network industries, antitrust policy, and constitutional law issues concerning economic regulation. I am the coauthor of four books concerning pricing, costing, competition, and investment in regulated network industries: *Deregulatory Takings and the Regulatory Contract: The Competitive Transformation of Network Industries in the United States* (Cam-

bridge University Press 1997), with Daniel F. Spulber; *Toward Competition in Local Telephony* (MIT Press & AEI Press 1994), with William J. Baumol; *Transmission Pricing and Stranded Costs in the Electric Power Industry* (AEI Press 1995), also with Professor Baumol; and *Protecting Competition from the Postal Monopoly* (AEI Press 1996), also with Professor Spulber. I am also the author of a fifth book, *Foreign Investment in American Telecommunications* (University of Chicago Press 1997), and of more than thirty scholarly articles in law reviews and economics journals. Some of those articles are directly relevant to the issues of investment, innovation, and competition posed by this proceeding.[5] I am the editor of *Is the Telecommunications Act of 1996 Broken? If So, How Can We Fix It?* (AEI Press 1999), *Competition in International Telecommunications* (AEI Press forthcoming 1999), and *Telecommunications Deregulation in Germany and the United States* (AEI Press forthcoming 1999).

9. I have testified before the U.S. Senate and House of Representatives. My writings have been cited by the Supreme Court, including Justice Breyer's opinion in the 1999 decision in *AT&T Corp. v. Iowa Utilities Board*. My writings also have been cited by the lower federal and state supreme courts and by state and federal regulatory commissions.

10. I have been a consultant on regulatory and antitrust matters to the Antitrust Division of the U.S. Department of Justice, to the Canadian Competition Bureau, and to more than thirty companies in the telecommunications, electric power, natural gas, mail delivery,

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5. *See* Abbott B. Lipsky, Jr. & J. Gregory Sidak, *Essential Facilities*, 51 STAN. L. REV. 1185 (1999); J. Gregory Sidak & Daniel F. Spulber, *The Tragedy of the Telecommons: Government Pricing of Unbundled Network Elements Under the Telecommunications Act of 1996*, 97 COLUM. L. REV. 1081 (1997); J. Gregory Sidak &

broadcasting, newspaper publishing, and computer software industries in North America, Europe, Asia, and Australia.

11. From Stanford University, I earned A.B. (1977) and A.M. (1981) degrees in economics and a J.D. (1981) in law. I was a member of the *Stanford Law Review*.

12. My name is David J. Teece. I am Mitsubishi Bank Professor, Haas School of Business, and director, Institute for Management, Innovation and Organization, University of California at Berkeley. I am also chairman of LECG, Inc. I have been a full professor at Berkeley since 1982. Before that, I was assistant and then associate professor of business economics at the Graduate School of Business, Stanford University. I received my Ph.D. in Economics from the University of Pennsylvania in 1975. As an industrial organization economist, I have studied the economics of technological change, competition policy, and business strategy issues for over two decades.

13. At U.C. Berkeley, I was the cofounder of the Management of Technology Program, a joint program between the School of Business and College of Engineering, and of the Consortium on Competitiveness and Cooperation, a multicampus research program linking scholars at Berkeley, Stanford, Columbia, Harvard, and Wharton who have deep and enduring interests in the long-run performance of the United States in the global economy. I am also chairman of the Consortium for Research on Telecommunications Policy Program, a multi-

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Daniel F. Spulber, *Givings, Takings, and the Fallacy of Forward-Looking Costs*, 72 N.Y.U. L. REV. 1068 (1997); J. Gregory Sidak, *Debunking Predatory Innovation*, 83 COLUM. L. REV. 1121 (1983).

campus research group with active nodes at U.C. Berkeley, the University of Michigan, and Northwestern University.

14. My research has been centrally concerned with the relationship between the structure of firms (especially the scope of their activities) and their economic performance, particularly their capacity to develop and introduce new technologies. I have had a special interest in innovation, organizational structure, and antitrust. I have testified before Congress on regulatory policy and competition policy and am the author or coauthor of over 100 books and scholarly articles. Books of mine that are relevant to this proceeding include *Strategy, Technology, and Public Policy* (Edward Elgar Publishing 1998); *Fundamental Issues in Strategy* (Harvard Business School Press 1994), with Richard P. Rumelt; *Antitrust, Innovation, and Competitiveness* (Oxford University Press 1992), with Thomas M. Jorde; and *The Competitive Challenge: Strategies for Industrial Innovation and Renewal* (1987). Relevant articles include "The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries," 43 *Antitrust Bulletin* 801 (1998), with Mary Coleman; "Telecommunications in Transition: Unbundling, Reintegration, and Competition," 4 *Michigan Telecommunications and Technology Law Review* 4 (1995); "Competition and Unbundling in Local Telecommunications: Implications for Antitrust Policy," published in *Towards a Competitive Telecommunications Industry: Selected Papers from the 1994 Telecommunications Research Conference* (Gerald Brock, ed., Lawrence Erlbaum Associates 1995), with Robert G. Harris and Gregory L. Rosston; and "Competition and Cooperation: Striking the Right Balance," *California Management Review* (Spring 1984),

with Thomas M. Jorde. I am also the founding editor of the economics journal *Industrial and Corporate Change*, published by the Oxford University Press.

15. Throughout the 1980s and 1990s, I have provided expert testimony on numerous occasions to the FCC, other state and federal regulatory agencies, the federal courts, and foreign regulatory bodies and courts on the competitive and strategic implications of regulatory and antitrust proceedings concerning both wireline and wireless telecommunications. That testimony has frequently encompassed the interplay between regulation and incentives for innovation, investment, and new product development. For example, I submitted testimony on behalf of AT&T in the divestiture case, *United States v. AT&T Corporation*; on behalf of Ameritech in support of its Customers First Plan; and, more recently, on behalf of Bell Atlantic and GTE in support of their proposed merger.

16. We file this affidavit in our individual capacities and not on behalf of the University of California, the American Enterprise Institute, or the Yale School of Management.

SUMMARY OF CONCLUSIONS

17. Section 251(d)(2) of the Telecommunications Act directs the Commission to consider "at a minimum" the "necessary" and "impair" standards when deciding whether to mandate unbundling of a network element. It is a sign of FCC's blindness to the costs of mandatory unbundling that the *Second Further Notice of Proposed Rulemaking* can only envision the phrase "at a minimum" adding considerations that would *increase* the likelihood of mandatory unbun-

dling.[6] Any considerations that might decrease the likelihood of mandatory unbundling, such as the effect of unbundling on innovation, appear outside the scope of the current debate. Yet, the *Antitrust Guidelines for the Licensing of Intellectual Property* suggest the goals of encouraging innovation and promoting the public interest are inextricably connected.[7] We submit, therefore, that innovation is exactly the "something more" that the FCC should consider when identifying which network elements shall be subject to mandatory unbundling at regulated prices.

18. Mandatory unbundling of network elements at total element long-run incremental cost (TELRIC) prices will diminish the incentives of both ILECs and CLECs to invest in existing facilities and new technologies. The Commission must therefore carefully weigh that cost against the putative benefits of any limiting principle that it promulgates to implement the "necessary" and "impair" standards of section 251(d)(2) of the Telecommunications Act. A firm's investment decisions are based on its careful weighing of the expected returns from the investment against the firm's weighted-average cost of capital. The mandatory unbundling rules that the Commission tentatively adopts, or hints in the *Second Further Notice of Proposed Rulemaking* that it will adopt, would decrease the incentives of both ILECs and CLECs to invest in existing facilities and new technologies by lowering the expected returns and increasing the weighted-average cost of capital for each group of firms.

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6. *SFNPRM, supra* note 4, at ¶ 30 ("Commenters should specifically identify any factors deemed sufficiently important in meeting the goals of the 1996 Act to require the unbundling of a network element, even if such unbundling did not otherwise meet the 'necessary' or 'impair' standards of sections 251(d)(2)(A) or (B) standing alone.").

7. U.S. Department of Justice & Federal Trade Commission, Antitrust Guidelines for the Licensing of Intellectual Property §1.0 & n.1 (patents, copyrights, trade secrets, and know-how agreements) [hereinafter *Intel-*

19. In Part I of this affidavit, we explain that government-mandated unbundling decreases an ILEC's incentives to invest in the upgrade and maintenance of *existing* facilities by reducing the *ex ante* payoffs of such investments.[8] Mandatory unbundling also distorts an ILEC's incentives with respect to investment in *new* technologies. In addition to lowering the expected returns of investment in existing facilities and new technologies, mandatory unbundling at regulated prices also raises an ILEC's weighted-average cost of capital.

20. In Part II, we examine how mandatory unbundling distorts the investment incentives of CLECs. First, mandatory unbundling at TELRIC prices encourages CLECs to delay entry into the local services market. Second, a generous unbundling policy encourages CLECs to demand a "bug free" version of the ILEC's network element and to request, at no cost to the CLEC, the offering of unbundled network elements (UNEs) from the ILEC with no intention of actually using them. Third, mandatory unbundling at TELRIC prices diminishes a CLEC's incentive to provide "plain old telephone service" (POTS) by innovative means. For

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lectual Property Guidelines]. The *Guidelines* state: "The intellectual property laws and the antitrust laws share the common purpose of promoting innovation and enhancing consumer welfare." *Id.* at §1.0.

8. The passage of the Telecommunications Act of 1996 has caused this disincentive to ILEC investment to be analyzed extensively in the scholarly literature on regulatory economics. *See* J. GREGORY SIDAK & DANIEL F. SPULBER, DEREGULATORY TAKINGS AND THE REGULATORY CONTRACT: THE COMPETITIVE TRANSFORMATION OF NETWORK INDUSTRIES IN THE UNITED STATES (Cambridge University Press 1997); ALFRED E. KAHN, LETTING GO: DEREGULATING THE PROCESS OF DEREGULATION, OR: TEMPTATION OF THE KLEPTOCRATS AND THE POLITICAL ECONOMY OF REGULATORY DISINGENUOUSNESS (Institute of Public Utilities and Network Industries, Michigan State University 1998); Debra Aron, Ken Dunmore & Frank Pampush, *The Impact of Unbundled Network Elements and the Internet on Telecommunications Access Infrastructure*, HARV. INFORMATION INFRASTRUCTURE PROJECT (Dec. 4, 1997); Robert W. Crandall, Managed Competition in U.S. Telecommunications 17 (AEI-Brookings Joint Center for Regulatory Studies, Working Paper 99-1, Mar. 1999); Jerry Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications*, BROOKINGS PAPERS ON ECON. ACTIVITY: MICROECONOMICS, 1997; Jerry Hausman, *Regulation by TSLRIC: Economic Effects on Investment and Innovations,* MULTIMEDIA UND RECHT, Mar. 1999, at 22; Robert G. Harris & C. Jeffrey Kraft, *Meddling Through: Regulating Local Telephone Competition in the United States*, 11 J. ECON. PERSP. 93 (1997).

example, an ill-conceived unbundling policy can undermine a CLEC's efforts to deploy POTS over a digital subscriber line (DSL) without the use of any circuit-switching apparatus.

21. In Part III, we discuss how mandatory unbundling and other Commission policies adversely interact to distort further the investment decisions of ILECs and CLECs. Relying on intellectual advances in antitrust analysis,[9] innovation markets,[10] and real-option theory,[11] we discuss in qualitative terms the direction and potential magnitude of those various effects. First, we demonstrate that the relationship between retail rates and costs in a particular geographic market strongly influences the entry decision of CLECs. Second, unbundling requirements at the input level eliminate bundling opportunities in the end-user market that would increase competition and thus benefit consumer welfare. Third, the Commission should address and resolve the commitment problem associated with its discretion to unbundle additional elements in the future.

22. In Part IV we examine recent innovations in several network elements, including switches, loops, transmission facilities, and digital subscriber line access multiplexers. Mandatory unbundling of those elements at TELRIC prices would jeopardize each of those innovative developments and thus threaten consumer welfare over the longer term.

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9. *See Intellectual Property Guidelines*, *supra* note 7.

10. *See* THOMAS M. JORDE & DAVID J. TEECE, ANTITRUST, INNOVATION, AND COMPETITIVENESS (Oxford University Press 1992); *see also* THOMAS M. JORDE, MARK LEMLEY, PETER MENELL & ROBERT MERGES, INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE (Little, Brown & Co. 1997).

11. *See, e.g.*, Aron, Dunmore & Pampush, *supra* note 8, at ¶ 6. For the fundamentals of decisionmaking under uncertainty, see AVINASH K. DIXIT & ROBERT S. PINDYCK, INVESTMENT UNDER UNCERTAINTY (Princeton University Press 1994); Avinash K. Dixit & Robert S. Pindyck, *The Options Approach to Capital Investment*, HARV. BUS. REV., May-June 1995, at 105.

23. We conclude that the Commission should not interpret the "necessary" and "impair" requirements of section 251(d)(2) to mandate unbundling of facilities that an ILEC has created through new or relatively recent investments. In such cases, the disincentive effects on both ILECs *and* CLECs are so great that the damage that would be done to the competitive process would be severe. Moreover, excessive unbundling of that sort would violate the stated policies in the Telecommunications Act of 1996 "to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation"[12] and "to encourage the rapid deployment of new telecommunications technologies."[13] The Commission should therefore decline to promulgate rules mandating the unbundling of network elements in which the ILEC has invested to provide advanced services,[14] as the agency proposed to do in another proceeding in 1998.[15]

I. THE EFFECT OF MANDATORY UNBUNDLING ON THE ILEC'S INVESTMENT DECISION

24. Investment results from voluntary exchange.[16] A firm's decision to invest in facilities and innovative activity depends upon its weighing the probability of earning excess re-

12. *See* 47 U.S.C. § 230(b)(2).

13. *See* Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 56 (preamble).

14. *See* 47 U.S.C. §§ 10(a), 11, 403.

15. *See* Deployment of Wireline Services Offering Advanced Telecommunications Capability, Memorandum Opinion and Order, and Notice of Proposed Rulemaking, CC Dkt. Nos. 98-147, 98-11, 98-26, 98-32, 13 F.C.C. Rcd. 24,011, 24,055-57 at ¶ 95-96 (1998) [hereinafter *Advanced Capability Memorandum Opinion and Order*]. In that proceeding, the FCC established seven conditions to govern the circumstances under which an ILEC's "advanced services affiliate" is deemed not to be an ILEC and, therefore, not subject to the unbundling requirements of section 251(c)(3). *Id.* at 24,055-57 ¶ 96.

16. *See* SIDAK & SPULBER, *supra* note 8, at 109.

turn from such investment against the risk of investment loss.[17] For example, any basic textbook on corporate finance will instruct managers to make an investment only if that investment has a positive net present value (NPV), or alternatively if the expected rate of return on that investment exceeds some appropriate measure of the firm's weighted-average cost of capital.[18] Other texts are even more explicit: "[S]enior management's most important job must be to maximize its firm's current market value."[19]

25. To formalize that investment rule, one must define several parameters. Let $p(b)$ be the probability of the "bad state of the world" and $p(g)$ be the probability of the "good state of the world." Similarly, let $r(b)$ be the return in the "bad state of the world" and $r(g)$ be the return in the "good state of the world." Finally, let c be the ILEC's weighted-average cost of capital. The *expected* return to the investment is simply the average return over all possible outcomes (in this case, we have assumed for simplicity only two possible outcomes), weighted by their respective probabilities, or $p(b) \times r(b) + p(g) \times r(g)$. An ILEC will invest in a project if and only if $p(b) \times r(b) + p(g) \times r(g) > c$.[20]

26. Many economic theories cannot be practically applied to the real world. The investment rule described above, however, represents a guiding principle in the discipline of corporate finance. Telecommunications executives making multibillion-dollar investments rec-

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17. *Id.* at 423-25.

18. *See* RICHARD A. BREALEY & STEWART C. MYERS, PRINCIPLES OF CORPORATE FINANCE 181 (McGraw-Hill 4th ed. 1991). The weighted-cost of capital for a firm is a weighting of the common equity and debt cost of capital according to the capital structure of the individual firm. *See, e.g.*, STEPHEN A. ROSS, RANDOLPH W. WESTERFIELD & JEFFREY JAFFE, CORPORATE FINANCE 161-88 (Irwin McGraw-Hill 5th ed. 1999).

ognize and act upon the importance of that fundamental principle. In late 1998, for example, AT&T's chief executive officer succinctly described the effect that mandatory unbundling of the cable television infrastructure would have on his company's incentives to invest: "No company will invest billions of dollars . . . if competitors which have not invested a penny of capital nor taken an ounce of risk can come along and get a free ride in the investments and risks of others."[21]

A. How Mandatory Unbundling at TELRIC Prices Affects Expected Returns

1. Investments to Lower the Marginal Costs of Existing Services

27. Mandatory unbundling decreases an ILEC's incentive to invest in upgrading its existing facilities by reducing the *ex ante* payoffs of such investment. Requiring a firm to grant to its competitors unbundled access to its facilities at TELRIC-based rates greatly reduces, if it does not eliminate entirely, the probability of excess return; such mandatory unbundling thus eliminates the ILEC's incentive to invest in existing facilities.[22] It makes no economic sense for the ILEC to invest in technologies that lower its own marginal costs so long as competitors can achieve the identical cost savings by regulatory fiat. Thus, by ensuring that the ratio of

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19. *See* G. BENNET STEWART III, THE QUEST FOR VALUE: A GUIDE FOR SENIOR MANAGERS 1 (HarperCollins 1990).

20. *See, e.g.*, BREALEY & MYERS, *supra* note 18, at 181.

21. *See* C. Michael Armstrong, *Telecom and Cable TV: Shared Prospects for the Communications Future*, as delivered to the Washington Metropolitan Cable Club (Nov. 2, 1998) (available on AT&T's website at http://www.att.com/speeches/98/981102.maa.html).

22. *See, e.g.*, Sidak & Spulber, *The Tragedy of the Telecommons*, *supra* note 5, at 1158–61.

marginal costs between an ILEC and its competitors is always constant, mandatory unbundling at TERLIC prices destroys the ILEC's incentive to continue investing in cost-reducing improvements to its own existing network facilities.[23] The regulator may respond by *compelling* investment—that is, conscripting private capital. But that "fix" would merely heap one regulatory distortion upon another and hasten disinvestment.

28. The disincentive that mandatory unbundling creates for investment has direct competitive consequences. For example, over the past several years, ILECs have been extending fiber in the network and replacing copper in the loop. Those upgrades have produced a number of positive benefits for end-users. Fiber is more reliable than copper wire, and it has higher quality in terms of cross-talk, signal-to-noise ratios, and other factors.[24] The investment also has had the advantage of decreasing the ILEC's marginal costs, and that cost reduction has made the ILEC's network more competitive with the networks that CLECs have been constructing. For example, one competitive access provider (CAP), Teleport Communications Group (TCG), stated in a 1996 securities prospectus:

> The Company uses the latest technologies and network architectures to develop a highly reliable infrastructure for delivering high-speed, quality digital transmissions of voice, data and video telecommunications. The basic transmission platform consists primarily of optical fiber equipped with high capacity SONET equipment deployed in self-healing rings. These SONET rings give TCG the capability of routing customer traffic simultaneously in both directions around the ring[,] thereby eliminating loss of service in the event of a cable cut.

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23. *See* SIDAK & SPULBER, *supra* note 8, at 545–57; Sidak & Spulber, *The Tragedy of the Telecommons*, *supra* note 5, at 1158–61; KAHN, *supra* note 8, at 101–03; Harris & Kraft, *supra* note 8, at 93.

24. For a comparison of the quality characteristics of fiber-optic networks and copper-based networks, see REGIS J. BATES & DONALD GREGORY, VOICE AND DATA COMMUNICATIONS HANDBOOK 631 (McGraw-Hill 1998).

> . . . Redundant electronics, with automatic switching to the backup equipment in the event of failure, protects against signal deterioration or outages. Continuous monitoring of system components focuses on proactively avoiding problems rather than just reacting upon failure.[25]

TCG further stated that one factor that promoted competition in local telecommunications markets after the AT&T divestiture was "technological advances in the transmission of data and video requiring greater capacity and reliability levels than copper-based ILEC networks were able to accommodate."[26] TCG, which has since merged into AT&T, noted in 1996 that "CAPS generally offered . . . improved reliability in comparison to [sic] the ILECs," but that "[i]n recent years, the ILECs steadily have been increasing the amount of fiber used in their networks, thereby decreasing the competitive advantage held by the CAPs in the special access and private line markets."[27]

29. The existing and planned entry by CLECs into local telecommunications markets shows that the new technologies available to CLECs offer cost and performance advantages over existing technologies currently used by ILECs. Moreover, because the largest of the CLECs have been acquired since 1996 by interexchange carriers (IXCs)—MFS by what is now MCI WorldCom, and TCG by AT&T[28]—the disincentive that mandatory unbundling creates for ILEC investment in network upgrades directly affects the robustness of competition between ILECs and the nation's two largest IXCs. In its *Second Further Notice of Proposed*

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25. TELEPORT COMMUNICATIONS GROUP, INC., PROSPECTUS FOR 23,500,000 SHARES OF CLASS A COMMON STOCK 50 (June 3, 1996). Since the enactment of the Telecommunications Act, the acronym CAP has given way to CLEC, which is a term of art in the 1996 legislation.

26. *Id.* at 42.

27. *Id.*

Rulemaking, the Commission "seek[s] comment on the relevance, if any, to the interpretation of the 'necessary' and 'impair' standard, that we are reexamining these issues today, more than three years after passage of the Act."[29] The recent entry of the major IXCs into the local access market should force the Commission to reexamine the meaning of "impairment" in that new competitive context.

30. If the Commission were to adopt a nationwide rule mandating unbundling of the loop at a TELRIC price, then the ILEC's benefits to investing in fiber upgrades would decrease. In particular, any advantages that the ILEC might achieve in marginal costs would be eliminated. Therefore, according to the investment decision articulated above, the ILEC's economic justification for incurring that cost would erode. Consumer welfare would fall in the amount of the portion of the cost savings that the ILEC otherwise could pass onto consumers. Moreover, end-users would have to defer the benefit of increased quality and reliability.

2. Investments in Unproven Technologies to Provide New Services

31. By reducing returns to investment in general, mandatory unbundling at TELRIC prices is likely to reduce direct innovation by the ILEC in the form of research and development, creation of intellectual property, and general product development. As two of us have previously written: "To maintain adequate incentives to invest in innovative activity, without providing government subsidies, free riding must be curtailed. This rationale is how economists justify patents, copyrights, trade secrets, and other aspects of intellectual property

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28. For a review of the consolidation in the CLEC industry, see Sterling Perrin, *The CLEC Market: Prospects, Problems, and Opportunities*, TELECOMMUNICATIONS INT'L , Nov. 1, 1998, at 41.

law."[30] The *Intellectual Property Guidelines,* issued by the Department of Justice and the Federal Trade Commission in 1995, echo this concern and emphasize that it is consonant with the consumer-welfare goals of the antitrust laws:

> The intellectual property laws and the antitrust laws share the common purpose of promoting innovation and enhancing consumer welfare. The intellectual property laws provide incentives for innovation and its dissemination and commercialization by establishing enforceable property rights for the creators of new and useful products, more efficient processes, and original works of expression. In the absence of intellectual property rights, imitators could more rapidly exploit the efforts of innovators and investors without compensation. Rapid imitation would reduce the commercial value of innovation and erode incentives to invest, ultimately to the detriment of consumers. The antitrust laws promote innovation and consumer welfare by prohibiting certain actions that may harm competition with respect to either existing or new ways of serving customers.[31]

Firms undertake innovative activities in the pursuit of higher returns, through the development of products having either unique qualities or superior quality-to-price ratios. Any requirement to share those innovative developments will therefore reduce the incentives to create them in the first place. In his separate opinion concurring in the Court's holding on "necessary" and "impair" in *Iowa Utilities Board*, Justice Breyer warned that "a sharing requirement may diminish the original owner's incentive to keep up or to improve the property by depriving the owner of the fruits of value-creating investment, research, or labor."[32] He further observed that this disincentive to investment increases with the technological sophistication of the network elements potentially subject to the mandatory unbundling rule:

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29. *SFNPRM, supra* note 4, at ¶ 14.
30. *See* JORDE & TEECE, *supra* note 10, at 52.
31. *Intellectual Property Guidelines, supra* note 7, at § 1.0.

> [A]s one moves beyond the sharing of readily separable and administrable physical facilities, say, to the sharing of research facilities, firm management, or technical capacities, these problems can become more severe . . . . Nor can one guarantee that firms will undertake the investment necessary to produce complex technological innovations knowing that any competitive advantage deriving from those innovations will be dissipated by the sharing requirement. The more complex the facilities, the more central their relation to the firm's managerial responsibilities, the more extensive the sharing demanded, the more likely these costs will become serious. And the more serious they become, the more likely they will offset any economic or competitive gain that a sharing requirement might otherwise provide.[33]

As Justice Breyer makes clear, the long-term harm to consumer welfare from reduced innovation may vastly exceed the short-term benefits from more rapid imitation of the fruits of prior innovative activity.

32. Technological progress in telecommunication network services has yielded new techniques, such as asymmetric digital subscriber line (ADSL), which has enabled ILECs to deliver advanced data services. ADSL uses the existing copper pair serving homes and businesses "to provide customers network access to the Internet and other popular multimedia and data services at speeds 50 times faster than an ordinary phone line."[34] Several ILECs have deployed ADSL, and, as of May 1999, consumers had begun to adopt the services supported by that technology.[35]

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32. *Iowa Utilities Board*, 119 S. Ct. at 753 (Breyer, J., concurring in part and dissenting in part) (concurring).

33. *Id.* at 753-54 (citing 1 HAROLD DEMSETZ, OWNERSHIP, CONTROL, AND THE FIRM: THE ORGANIZATION OF ECONOMIC ACTIVITY 207 (1988)).

34. *See* AMERITECH CORP., 1998 SEC FORM 10-K, at 21 (1999) (glossary).

35. For example, it is reported that 20 percent of Bell Atlantic customers in New York and Boston will be served by central offices equipped for ADSL by the end of 1999, and that 80 percent of those customers are expected to be served by the end of 2000. *See* Brian Quinton, *ADSL picks up more speed*, TELEPHONY, Apr. 5, 1999, at 6.

33. Because of such progress, the Commission is now considering whether it should lengthen the list of network elements subject to mandatory unbundling pursuant to the "necessary" and "impair" standards of section 251(d)(2). The *Second Further Notice of Proposed Rulemaking* states:

> We also see nothing in the statute or the Supreme Court's opinion that would preclude us from requiring that loops that must be unbundled must also be conditioned in a manner that allows requesting carriers supplying the necessary electronics to provide advanced telecommunications services, such as digital subscriber line technology (xDSL).[36]

Under such a scenario, an ILEC would be compelled to share the following network elements with its competitors:

- *Dark fiber.* This is fiber that does not have connected to it the electronics required to transmit data on such fiber.[37]
- *Packet switching.* This is a method of transmitting messages as digitized bits, assembled in groups called "packets" or "cells." These packets and cells contain industry-standard defined numbers of data bits, along with addressing information and data integrity bits. The switching (or routing) of the packets or cells of data replace the circuit-switching of traditional voice telephone calls. Packet and cell

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36. *SFNPRM, supra* note 4, at ¶ 32. *See also id.* at ¶ 34 (seeking comment on whether to "modify the definition of 'loops' or 'transport' to include dark fiber"); *id.* at ¶ 35 (seeking comment on mandatory unbundling of DSLAMs and packet switches).

37. *See* INTERMEDIA COMMUNICATIONS INC., 1999 SEC FORM 10-K, at 53 (1999) (glossary).

switching is considered to be a more cost-efficient method of delivering voice and data traffic than circuit switching.[38]

- *Digital subscriber line access multiplexers (DSLAMs).* The DSLAM concentrates the data traffic from multiple DSL loops onto the backbone network for connection to the rest of the network. The DSLAM provides back-haul services for packet, cell, and/or circuit-based applications through concentration of the DSL lines onto 10Base-T, 100Base-T, T1/E1, T3/E3, or ATM outputs.[39]

In addition, some CLECs and even state lawmakers have urged that an ILEC be subjected to mandatory unbundling of the portion of spectrum above 4 kHz on its subscriber line, a practice that has been dubbed "spectrum sharing" or "bandwidth sharing" or "line splitting."[40] In

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38. *Id.* at 54. *See generally* J. Gregory Sidak & Daniel F. Spulber, *Cyberjam: The Law and Economics of Internet Congestion of the Telephone Networks*, 21 HARV. J.L. & PUB. POL'Y 327 (1998) (discussing packet-switched and circuit-switched networks).

39. PARADYNE CORPORATION, THE DSL SOURCE BOOK 27 (2d ed. 1998) (available at http://www.paradyne.com/sourcebook_offer/index.html).

40. For example, the California state legislature is considering such a policy:

> If the Federal Communications Commission does not adopt an order on or before January 1, 2000, with regard to its proceeding entitled "In the Matters of Deployment of Wireline Services Offering Advanced Telecommunications Capability," CC Docket No. 98-147, adopted March 18, 1999, that the Public Utilities Commission expeditiously examine the technical, operational, economic, and policy implications of line sharing and, if the Public Utilities Commission determines it to be appropriate, adopt rules to require incumbent local exchange carriers in this state to permit competitive data local exchange carriers to provide high bandwidth data services over telephone lines with voice services provided by incumbent local exchange carriers.

A.B. 991, Calif. Legis., 1999-2000 Reg. Sess., §2(b), lines 4-17 (amended Apr. 22, 1999). *See also* Comments of Covad Communications Co., Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Dkt. 98-147, at 48 (received Sept. 25, 1999); Comments of E.Spire Communications, Inc., Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Dkt. 98-147, at 36-37 (received Sept. 25, 1999); Comments of Northpoint Communications, Inc., Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Dkt. 98-147, at 38-39 (received Sept. 25, 1999). The label

1999, the FCC found that this proposed regulatory intervention would be technically feasible.[41] That conclusion was portentous, for it is a prerequisite to any subsequent Commission order of mandatory unbundling of wireline bandwidth at regulated prices.

34. When investing in a particular technology to support a new service, an ILEC bears two risks. First, consumers may not adopt the service as widely as informed parties envision at the time that the ILEC must commit to its investment. Second, consumers may adopt the product, but with a different supporting technology. In the best-case scenario, when the new service is widely adopted by consumers and the technology chosen by the ILEC proves to be the most effective, a policy of mandatory unbundling enables the CLEC to purchase the ILEC's unbundled element at cost, as set by TELRIC. Alternatively, if either of the risks eventuates, then the CLEC does not bear any of the cost; to the contrary, the ILEC's shareholders bear the entire cost of the unsuccessful investment. Thus, mandatory unbundling at TELRIC is equivalent to the government's grant to the CLEC of a *free option* to consume, at incremental cost, the fruits of the ILEC's investment.[42] Of course, that option is not "free" in terms of either its private costs to ILEC shareholders or its social costs to consumer welfare because of the ILEC's diminished levels of investment in innovation.

"spectrum sharing" is unfortunate because it is likely to cause confusion about the access line (wireless versus wireline) being unbundled.

41. *See* Deployment of Wireline Services Offering Advanced Telecommunications Capability, First Report and Order and Further Notice of Proposed Rulemaking, CC Dkt. No. 98-147, at ¶ 78, ¶¶ 102–07 (released Mar. 31, 1999) [hereinafter *Advanced Services FNPRM*].

42. *See* Hausman, *Valuing the Effect of Regulation on New Services in Telecommunication, supra* note 8; Hausman, *Regulation by TSLRIC, supra* note 8.

35. Thus, the Commission's imposition of mandatory unbundling aimed at unproven technologies that are necessary to support new services would severely damage the ILEC's incentives to invest. Suppose, for example, that an ILEC has an opportunity to make a $100 investment in a new technology such as asynchronous transfer mode (ATM) switches.[43] Suppose further that, in the absence of mandatory unbundling, the firm will receive with equal probabilities a payoff of $90 or $150. We hypothesize that the $90 payoff corresponds to a future where internet protocol (IP) routers are the superior packet-switching technology, while the $150 payoff corresponds to an outcome where ATM switches are indeed the superior technology.[44] Assuming that the ILEC's cost of capital is 15 percent, the ILEC would make that investment in the absence of mandatory unbundling at TELRIC prices, as its expected rate of return would exceed its cost of capital. The expected revenue would be $120 (= 50% x $90 + 50% x $150), which would imply an expected return of 20 percent. The expected excess return does *not* imply or assume that the ILEC possesses market power of any sort.[45] As noted above, any rational firm will seek to invest in projects when the expected return exceeds the firm's cost of capital.

36. To extend the example of an ILEC's investment in ATM switches, consider now the case where the ILEC must provide CLECs unbundled access to ATM switches at

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43. ATM is a high bandwidth, low-delay, connection-oriented, packet-like switching and multiplexing technique. *See* BATES & GREGORY, *supra* note 24, at 693-94.

44. For an overview of the pros and cons of those two packet-switching alternatives, see Susan Breidenbach, *Switching Grows Up: The Entire Report*, NETWORK WORLD, May 4, 1998 (available at http://www.nwfusion.com/news/0504switch9.html).

TELRIC prices. In the adverse case, where the ILEC selects a technology that turns out to be inferior in hindsight, its payoff is likely to remain the same, as CLECs will not demand access to an inferior technology. The payoff in the favorable case, however, is substantially lower than it would be in the absence of mandatory unbundling. TELRIC is based upon the ILECs' current effective cost of capital, which is 15 percent in our example. Therefore, the TELRIC-based price for the network element will be set to permit an *ex post* rate of return on capital of 15 percent. Thus, the ILEC will be limited to earning a 15 percent return on the network element that the ILEC uses to supply new services to end-users, as well as only a 15 percent rate of return on compulsory access to that network element that the ILEC provides to CLECs. A rational ILEC will expect that outcome and correctly calculate that the introduction of mandatory unbundling with TELRIC prices will cut the *ex ante* expected return on investment from 20 percent to 2.5 percent. The calculation is straightforward. Half of the time, IP routers are the preferred technology, giving the ILEC a payoff of $90. The other half of the time, ATM switches are the better technology, but TELRIC unbundling lowers the *ex post* payoff to $115 (an *ex post* return of 15 percent). The *ex ante* expected return is therefore 2.5 percent (50% x $90 + 50% x $115 = $102.50). Given a cost of capital of 15 percent, the ILEC will rationally decline to invest in ATM switches. In addition, the amount of investment in ATM switches would fall relative to investment in IP routers. Thus, mandatory unbundling of se-

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45. *See* David J. Teece & Mary Coleman, *The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries,* 43 ANTITRUST BULL. 801, 820-22 (1998) (distinguishing monopoly rents from Schumpeterian returns from innovation).

lected elements not only lowers overall investment in that element, but also distorts investment choices toward elements that are believed to be less susceptible to mandatory unbundling.

37. Through a second example, we can further explore the asymmetric effect of mandatory unbundling on investments in advanced services and new technology. Suppose that the Commission requires an ILEC to offer unbundled access to DSLAMs. If DSL is not widely adopted by consumers, perhaps because it becomes eclipsed by cable modems over cable television networks, then CLECs will not demand unbundled access to the DSLAMs, and the ILEC will unilaterally bear the risk of consumer rejection. Alternatively, if DSL is widely adopted by consumers, then CLECs, by obtaining unbundled DSLAMs at TELRIC prices, will be able to compete away any risk reward that the ILEC would hope to earn on its investment in an uncertain technology. In practice, the ILEC will earn at most its cost of capital. The ILEC cannot know with certainty, however, whether DSL will be widely adopted by consumers. Therefore, in the presence of mandatory unbundling, the ILEC will rationally expect that regulation will greatly diminish the reward for successful innovation. The ILEC will therefore choose to reduce investments in the new technology or avoid such investments altogether.

38. An additional disincentive can arise from the interplay of TELRIC pricing rules and the declining path of costs over time in markets subject to technological progress. Regulators set TELRIC prices on the basis of their estimates of the forward-looking cost of investment.[46] Telecommunications equipment is generally subject to its own version of Moore's

46. *See Local Competition First Report and Order*, *supra* note 2, 11 F.C.C. Rcd. at 15,541 ¶ 79.

Law,[47] with rapidly declining costs over time for capacity.[48] Indeed, this kind of productivity growth is the premise for ILEC price-cap regulation.[49] An ILEC will correctly expect that (1) the forward-looking cost of investment in a facility will decline over time; and (2) TELRIC rules applied every year over the life of the asset in an *ex post* manner will ratchet down to a new, lower forward-looking cost, such that the ILEC will be denied an opportunity to recover its cost of capital.[50]

39. To apply this lesson to ILEC investment in new technologies, we return to our earlier example. Recall our previous hypothetical investment opportunity, requiring an outlay of $100 today (for example, for a line card for a DSLAM). Suppose that the price of that unit is expected to decline at a rate of 2 percent per year in real terms, owing to productivity improvements in manufacturing. Because TELRIC prescribes the use of the *current* forward-looking cost applied to past investment, the TELRIC cost basis for the investment calculated in

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47. Gordon Moore, the cofounder of Intel Corporation, predicted in 1965 that

> computer chip complexity would double every twelve months for the next ten years. Ten years later his forecast proved true. He then forecasted that the doubling would occur every two years for the next ten years. Again history demonstrated his accuracy. The average of the two estimates is often stated as doubling every 18 months.

HARRY NEWTON, NEWTON'S TELECOM DICTIONARY 508 (Miller Freeman 15th ed. 1999).

48. *See* Jerry Hausman, *Cellular Telephone, New Products, and the CPI*, 17 J. BUS. ECON. & STAT. 188 (1999).

49. *See* ROBERT W. CRANDALL & LEONARD WAVERMAN, TALK IS CHEAP: THE PROMISE OF REGULATORY REFORM IN NORTH AMERICAN TELECOMMUNICATIONS 75-96 (Brookings Institution 1995); DAVID E. M. SAPPINGTON & DENNIS L. WEISMAN, DESIGNING INCENTIVE REGULATION FOR THE TELECOMMUNICATIONS INDUSTRY 80-88 (MIT Press & AEI Press 1996).

50. *See* SIDAK & SPULBER, *supra* note 8, at 419-25; Sidak & Spulber, *Givings, Takings, and the Fallacy of Forward-Looking Costs*, *supra* note 5, at 1139-45; Affidavit of Jerry Hausman on Behalf of the United States Telephone Association, Implementation of the Local Competition Provisions of the Telecommunications Act of

2002 would only be $94 in constant real terms.[51] Modifying our previous example to include that reduced TELRIC cost basis, we see that the ILEC's *ex ante* expected return for the third year is as low as *negative* 1 percent—a loss of capital, let alone a denial of any opportunity to earn a competitive return on capital.[52] The ILEC would therefore be forced *ex post* to unbundle the element at a rate that makes the ILEC's investment unprofitable *ex ante*. No reasonable firm would choose to invest under those conditions. Consumers suffer as a result, because the mandatory unbundling deters efficiency-enhancing investments.

40. Therefore, the combination of TELRIC pricing and expected declines in forward-looking costs compounds the disincentive effect of mandatory unbundling on investment in new technologies. Although the Commission has recognized the possibility that it would be necessary to incorporate higher-than-customary rates of depreciation and return in its TELRIC calculations,[53] it has yet to change historical depreciation in its actual implementation of its policy on mandatory unbundling. Thus, the disincentive effects of a properly computed forward-looking TELRIC are compounded by the improper use of historical depreciation schedules that often have been deliberately elongated by state regulators to keep local rates low.[54]

1996, CC Dkt. No. 96-98 (F.C.C. May 1996); Letter from Alfred E. Kahn to Hon. Reed E. Hundt, then-Chairman of the FCC (Jan. 14, 1997); KAHN, *supra* note 8. This effect has been called "anticipatory retardation."

51. Projecting a 2 percent annual decline in cost in real terms over the three years between 1999 and 2002, we obtain a price in 2002 of $94 (= $100 ÷ 1.023).

52. The payoff to the "adverse" technology is unaffected (IP routers are the preferred technology, giving the ILEC a payoff of $90 with 50 percent probability). The other half of the time, ATM switches are the better technology, but mandatory unbundling at forward-looking TELRIC prices reduces the ILEC's *ex post* payoff to $108 (the projected cost basis of $94 plus a return of 15 percent). The *ex ante* expected return therefore falls even lower, to negative 1% (50 % x $90 + 50% x $108 = $99).

53. *See Local Competition First Report and Order, supra* note 2, 11 F.C.C. Rcd. at 15,849 ¶ 686.

54. *See* SIDAK & SPULBER, *supra* note 8, at 200.

Those considerations imply that the Commission should allow ILECs to make investments in advanced services in a regulatory environment in which the market will entirely determine the eventual rate of return. That conclusion holds with even greater force when one recognizes, as is documented by the earlier quotes from the SEC filings of the CAPs that were subsequently acquired by AT&T and MCI WorldCom, that an ILEC cannot be said to be an "incumbent" with respect to any new technology or service.[55]

41. The Commission itself has recognized how important incentives are to the innovation process and has already proposed a regulatory environment in which an ILEC may invest in advanced services without the threat of constant regulation, including mandatory unbundling at TELRIC prices:

> We now explore the circumstances under which an advanced services affiliate would not qualify as an "incumbent LEC" under the definition set forth by Congress in section 251(h), and thus would not be subject to section 251(c) obligations. We also tentatively conclude that an advanced services affiliate, to the extent it provides interstate exchange access services, should, under existing Commission precedent, be presumed to be nondominant. Therefore, such affiliate would not be subject to price cap regulation or rate of return regulation for its provision of such services. We tentatively conclude that such an affiliate, as a non-incumbent, also should not be required to file tariffs for its provision of any interstate services that are exchange access.[56]

Conditional on satisfying a number of criteria, an ILEC may create a separate affiliate that would be exempt from the requirements of section 251(c). The Commission recognized that by allowing ILECs to create separate subsidiaries that are exempt from the unbundling require-

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55. *Id.* at 80-81.

56. *See Advanced Capability Memorandum Opinion and Order*, *supra* note 15, 13 F.C.C. Rcd. at 24,055-59 ¶¶ 95-100 (footnotes omitted).

ments in the Telecommunications Act, the agency could increase the likelihood that ILECs would continue to have an incentive to invest, develop products, and innovate.

42. Finally, we note that mandatory unbundling of a new technology is a disguised form of industrial policy.[57] Ironically, the Commission has attempted to distance itself from such blatant regulatory intervention. It stated two months before its issuance of the *Second Further Notice of Proposed Rulemaking*: "The role of the Commission is not to pick winners or losers, or select the 'best' technology to meet consumer demand, but rather to ensure that the marketplace is conducive to investment, innovation, and meeting the needs of consumers."[58] Rather than fund its program of developing broadband networks through a broad financing scheme, the Commission, assuming that it is acting with the authority the U.S. government, has chosen to finance its version of industrial policy solely by taxing ILECs through TELRIC price regulation and compulsory access. If the government wants to subsidize the development of a new technology, then there should be nondiscriminatory funding ex ante *and* nondiscriminatory access ex post. But if the funding is *not* competitively neutral, then access should not be either. The Commission cannot have it both ways. It is well established, under cases such as *Monsanto*

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57. Industrial policy largely has been discredited in the economics profession. For examples of industrial policy failures, see SIDAK & SPULBER, *supra* note 8, at 495-97; PAUL R. KRUGMAN & MAURICE OBSTFELD, INTERNATIONAL ECONOMICS: THEORY AND POLICY 285-92 (Addison-Wesley 4th ed. 1997); J. Gregory Sidak & Daniel F. Spulber, *Deregulation and Managed Competition in Network Industries,* 15 YALE J. ON REG. 117 (1998).

58. *See* Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Report, CC Dkt. No. 98-146, at ¶ 5 (released Feb. 2, 1999) [hereinafter *Advanced Services Report*].

and *Kaiser Aetna,*[59] that the compelled sharing of the fruits of private investment can be a taking of property entitled to just compensation under the Fifth Amendment.

B. How Mandatory Unbundling Affects the Weighted-Average Cost of Capital

43. In the examples presented above, we have assumed that the ILEC's cost of capital, which serves as the benchmark of comparison for all expected-return calculations, has remained constant.[60] Unfortunately, that assumption ignores the impact that mandatory unbundling has on the riskiness and cyclicality of the ILEC's economic performance and hence on the ILECs' weighted-average cost of capital. Mandatory unbundling raises both components of the weighted-average cost of capital for ILECs—equity and debt.

1. Mandatory Unbundling Raises the Cost of Equity Capital

44. The cost of equity capital depends on the systematic or "beta" risk of the firm. Beta risk is any risk whose source is related to economy-wide effects. An immediate implication of systematic risk is that it cannot be eliminated through diversification.[61] Beta risk is measured by examining the sensitivity of a firm's stock price to the movements of a broad portfolio that contains the stocks of all firms in the economy. For example, one would expect to see higher betas for companies in industries that are highly cyclical.[62] Investors demand a

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59. Kaiser Aetna *v.* United States, 444 U.S. 164 (1979); Ruckelshaus *v.* Monsanto Co., 467 U.S. 986 (1984).

60. For a clear exposition of cost-of-capital analysis, see EUGENE F. BRIGHAM & LOUIS C. GAPENSKI, INTERMEDIATE FINANCIAL MANAGEMENT 167-210 (Dryden Press 5th ed. 1996).

61. *See* BREALEY & MYERS, *supra* note 18, at 137-38.

62. For a description of how cyclicality affects beta, see ROSS, WESTERFIELD & JAFFE, *supra* note 18, at 300. Other factors that influence beta include operating leverage and financial leverage.

larger risk premium for stocks with large betas because such stocks contribute more to the volatility of an investor's overall portfolio.[63]

45. How does mandatory unbundling affect an ILEC's beta and thus its cost of equity? The answer depends on how unbundling affects the cyclicality of an ILEC's returns. The effect of unbundling is to make an ILEC more sensitive to swings in the overall economy. In particular, a CLEC is more likely to lease the unbundled elements of the ILEC's network in times of weak demand for telecommunications services. Weak demand for a telecommunications service lowers its price and thus makes it harder for a CLEC to justify facilities-based entry, which not only may be more expensive in the short-term, but also may require investment that has a greater degree of sunk (as opposed to merely fixed) cost than does the leasing of UNEs at TELRIC prices over rather short lease terms. Alternatively, in times of high demand, a CLEC is more inclined to enter as a facilities-based competitor. Thus, the *timing* of the CLEC's request for unbundled network elements exaggerates the ILEC's risk of loss during times of weak demand. An ILEC's profits will fall in the face of CLEC entry through mandatory unbundling because the CLEC will capture some customers from the ILEC. The ILEC's profit will fall even more if the access price for the unbundled network element is calculated by regulators in a manner that is not compensatory. The combination of lower returns during "weak demand" and unaffected returns during "high demand" intensifies the cyclicality of an ILEC's returns.

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63. Of course, other factors such as dividend yield, affect the cost of equity capital as well. *See, e.g.*, Mukesh Bajaj & Anand M. Vijh, *Dividend Clienteles and the Information Content of Dividend Changes*, 26 J. FIN.

46. Because there has not been a recession since the passage of the Telecommunications Act of 1996, that conjecture about increased systematic risk is not falsifiable. There exist no data with which to test our conjecture empirically. What matters, however, is whether the capital markets understand the possibility of increased cyclicality and thus penalize ILECs by requiring them to produce a higher (risk-adjusted) return on equity investment.

47. In summary, one would expect mandatory unbundling at TELRIC prices to increase beta for an ILEC by increasing the cyclicality of the company's financial performance. As a result, an ILEC's investors would demand a larger risk premium to hold the ILEC's stock because that stock would contribute more to the volatility of the investor's overall portfolio. The larger risk premium would imply a higher cost of equity capital for an ILEC.

2. Mandatory Unbundling Raises the Cost of Debt Capital

48. Mandatory unbundling also raises the ILEC's cost of debt. It is well established in corporate finance that debt financing is a less expensive source of capital than equity financing.[64] For any given level of financial risk, debt financing is preferable to other forms of capitalization because the interest that the firm pays is a tax-deductible expense.[65] A firm will continue to invest through debt offerings until the additional tax paid by lenders on an extra dollar of interest equals the corporate tax shield on an extra dollar of interest. As Professors Brealey and Myers observe, uncertainty is the enemy of debt financing: "If companies cannot be sure of taxable profits in the future, the expected corporate tax saving will be less, and less

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ECON. 193 (1990).

64. *See* BREALEY & MYERS, *supra* note 18, at 432.

debt will be issued."[66] Increased uncertainty limits a firm's ability to debt finance because the threat of financial distress trumps the corporate tax savings at an earlier stage of the capital allocation process.

49. Mandatory unbundling increases the cost of debt capital for an ILEC because it increases uncertainty for the firm. Under the FCC's current regime of mandatory unbundling, an ILEC is required to make the sunk investment to provide a particular UNE on the basis of expected orders submitted by requesting CLECs. The requesters, however, are not required to make firm commitments to take specified volumes of the UNE for a minimum contract duration. If the ILEC makes the UNE available but there are no CLEC orders that actually materialize for the UNE, as has occurred with unbundled switching, the ILEC is forced to bear that entire cost. This allocation of risk distorts competition: The ILEC is compelled to impute *to itself* this additional transition cost of mandatory unbundling when providing the network element in question to one of its affiliates. On the other hand, the CLECs do not need to incur that unbundling cost or impute it to themselves, to their affiliates, or to any other party with whom they choose to do business. Because an ILEC must bear all the risk of mandatory unbundling, the uncertainty of the ILEC's profits naturally rises. Moreover, because an ILEC will be limited in the *share* of total financing that it may structure as debt (a cheaper source than equity), the firm will experience an increase in its overall cost of capital. That effect, in addition to the increase in the cost of equity described above, will serve to undermine further

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65. *Id.* at 422.
66. *Id.* at 433.